

REMARKS

The Examiner's reconsideration of the application is requested in view of the claim amendments above and comments which follow.

The feature of the spindle casing having a shorter radial dimension than the motor housing in the direction of the cam shaft has been added to claim 1. This feature is defined with reference to the location of the cam shaft, and accordingly the claims have been changed to be directed to a grinding machine including a spindle instead of a spindle alone. This leads to the relative positions of the spindle casing and the camshaft being identified with reference to the grinding machine. Basis for the changes can be found, for example, in the second paragraph on page 3 of the specification and in Figure 3.

The Examiner has rejected all of the claims under 35 U.S.C. §103 as being unpatentable over Pflager (U.S. 5443413) in view of Suzuki (JP11013759A). Claim 11 has also been rejected over the same combination when further in view of Lundin (U.S. 5,103,701). Reconsideration is requested.

Two key differences between the grinding machine of amended claim 1 and that described by Pflager are as follows:

- (1) The spindle shaft is carried by three hydrostatic bearings; and
- (2) The spindle casing projects to a lesser extent than the motor housing towards the location where the camshaft is mounted in use of the grinding machine.

In relation to difference (1), it can be seen that the spindle of Pflager is supported by two hydrostatic bearings disposed to one side of the drive motor. The spindle of claim 1 is supported by a further hydrostatic bearing is disposed on the opposite side of the motor. It is asserted by the examiner that the inclusion of this additional bearing would have been obvious in view of Suzuki. It is to be noted that Suzuki relates to a "spindle device", without specific reference in the abstract to use of such device in a grinding machine.

As submitted previously, it was known prior to the present invention to provide two bearings on one side of a motor to support a grinding wheel spindle. However, provision of a grinding wheel spindle with three bearings had not previously been

contemplated due to the belief in the field that over-constraints of the shaft will occur, leading to bearing overload. Accordingly, provision of three bearings as in the claimed invention was a radical step. Combination of the disclosure of Pflager with the generic spindle device of Suzuki would not have been a natural one to make on the basis of "knowledge which was within the level of ordinary skill at the time the claimed invention was made".

Turning to difference (2) above, figure 1 of Pflager shows grinding of a workpiece 63 by a grinding wheel 18. Wheelbase 1 is equated by the examiner with the spindle casing of claim 1. The workpiece is supported by a support device 62. It can be seen in Figure 1 that wheelbase 1 extends significantly further than the housing of motor 40 in the direction towards the workpiece 63.

In a grinding machine according to claim 1, distinguishing features (1) and (2) are provided in combination to achieve a desired result not otherwise possible. That result is the capability to grind re-entrant cams on a long camshaft without the spindle housing interfering with the tips of other cams on the shaft.

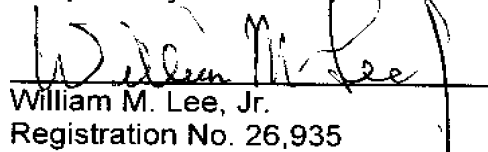
The reduced dimensions of the spindle housing facilitate the use of a smaller diameter grinding wheel, as desired for grinding re-entrant cams for example. Provision of three hydrostatic bearings facilitates the use of a longer, more slender shaft within the narrower housing by increasing the effective shaft stiffness. The shaft can then be made at least as long as the axial length of a camshaft to be ground so that cam lobes do not foul the motor housing.

In summary, it is submitted that the claimed invention is distinguished from the cited references in ways which are not obvious from those documents, whether considered alone or in combination, in order to achieve a new and advantageous result.

Favorable reconsideration is therefore urged.

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Respectfully submitted,



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